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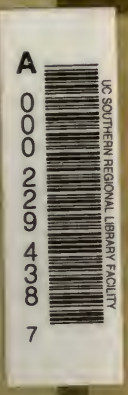
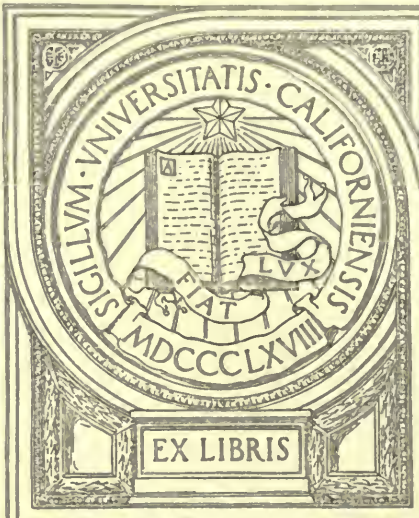


United States. Congress. House
Union Pacific railroad, eastern division. Letter from the secretary of the interior

UNIVERSITY OF CALIFORNIA
AT LOS ANGELES



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UNION PACIFIC RAILROAD, EASTERN DIVISION.

LETTER

FROM THE

SECRETARY OF THE INTERIOR,

IN ANSWER TO

resolution of the House of Representatives of December 5, 1868, *transmitting report of special commissioner, relative to the examination of that road and the Sioux City and Pacific railroad.*

NUARY 6, 1869.—Referred to the Committee on the Pacific Railroad and ordered to be printed.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., January 6, 1869.

SIR: Pursuant to the House resolution of the 5th instant, I have the nor to transmit herewith copies of the reports of the special commissioners on the Union Pacific railway, eastern division, and the Sioux ty and Pacific railroad. No other report on any of the branches of e Union Pacific railroad has been received since the date mentioned the resolution.

I am, sir, very respectfully, your obedient servant,

O. H. BROWNING, *Secretary.*

Hon. SCHUYLER COLFAX,
Speaker of the House of Representatives.

WYANDOTTE, KANSAS,
December 4, 1868.

SIR: The special commission having completed their report of the xamination of the Union Pacific railroad on the 23d of November, and rwarded the same, set out on the 24th for this place, to examine and port upon the Union Pacific railway, eastern division. The health of ne of the commissioners did not permit him to make this examination, id it was therefore undertaken by the two members whose names are gned to this report. We deemed it proper to do so, constituting, as we d, a majority of the commission.

Wyandotte was reached on the 25th of November, at which place we et the general superintendent of the road, and as the company's offices ere at Lawrence, we repaired to that place the same day. The forenoon of the 26th we spent in looking over the maps and profiles, and in ne afternoon we set out with a special train, accompanied by the general

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superintendent, for the west end of the track. Before dark we had examined as far as Wamego, 62½ miles from Lawrence; but the train kept on to Fort Hays, and stopped there till morning. On the 27th we examined the road to the west end of the track and returned to Fort Hays to stop over night. On the 28th we completed the examination by daylight back to Wamego, and returned to Lawrence, remaining there over Sunday. On the 30th of November we completed the examination east to the State line, the initial point of the road. There had been some snow on the track, but it had disappeared, so as to leave us a good view of the road bed, and where it remained in the sides of the cuts it but served to illustrate, in a moderate way, the effects of wind-drifts, the wind having been from the south. We returned to Lawrence to complete our study of the maps and profiles, &c., and prepare our report, and we were aided in every way desired by the officers of the road.

The extent and character of the road is such that no division of it will be necessary in making our report upon it, and, preserving nearly the same order in considering the different parts of it, as we did of the one previously reported on, we proceed first with the—

GENERAL AND DETAILED LOCATION, GRADES, AND CURVATURE.

The north side of the valley of the Kaw river is much more favorable than the other for the road, because the bottom lands are broader and more continuous on the north side than upon the opposite one. The road is therefore properly located on the north side all the way to the junction of the Smoky Hill and Republican Forks.

If the objective point of the road be regarded as Denver City, we commissioners have not the information for determining whether the Republican or the Smoky Hill Fork furnishes the best location; but as the law authorized the location up the latter, and this was selected, it is presumed to be the better, and it undoubtedly is so, for making an extension of the line to the head of the Arkansas river or to New Mexico. The road is then located in the valley of the Smoky Hill Fork, as high up as Salina. The elevation attained here is 1,293 feet above the sea level; the distance from the initial point is 185 miles, and the elevation there 690 feet. At Salina the road leaves the main valley to avoid the great southerly bend made by the Smoky Hill Fork, and goes up the valley of Spring creek to its source. The first summit reached has an elevation of 1,550 feet. The road then descends 65 feet, to cross Alum creek; it ascends the next ridge to an elevation of 1,583 feet, and then it descends 85 feet to cross Clear creek; it again ascends a ridge to an elevation of 1,602 feet, and then descends 130 feet to regain the Smoky Hill Fork at Fort Harker, where the elevation is 1,472 feet above the sea. The line between this last point and Salina is generally direct, but it has a great deal of curvature and high grades, the maximum grade each way being 74 feet per mile.

Fort Harker is 218 miles from the initial point. The Smoky Hill Fork has not here the same wide bottom lands which characterized it at Salina. It is crooked and shut in with higher banks, which apparently increase in height as you go westward. The road, therefore, follows the stream only 12 miles above Fort Harker, and near Cow Creek station turns off to the north to gain the ridge between the Smoky Hill and Saline Forks. The maximum grade ascending is 53 feet per mile, and the line reaches an elevation of 1,973 feet. It descends from this ridge to reach Fort Hays, on Big creek, with a maximum grade of 53 feet per mile. Fort Hays has an elevation of 1,933 feet, and is 288½ miles from the initial point.

The road continues in the valley of Big creek, west of Fort Hays, for about 10 miles, and there again ascends to the ridge between the Smoky Hill Fork and the Saline Fork. This is done with a maximum grade of 58 feet per mile. The highest point the road reaches is on this ridge at Monument station, and is there 3,276 feet above the sea, and 385½ miles from the initial point.

In order to reach Fort Wallace, on the Smoky Hill Fork, the road again leaves the ridge and descends to the north fork of the Smoky Hill Fork, at which place the track terminates, 405 miles from the initial point. The maximum grade in this last descent is 66 feet per mile. Fort Wallace is distant some 12 miles from the present terminus. These three descents from the main ridge to reach Forts Harker, Hays, and Wallace, greatly injure the road in regard to grades. The difference of level between the termini is 2,352 feet. The sum of the ascents made going west is 4,529 feet, and the consequent ascents going east are 2,177 feet. The length of the straight line is about 350 miles. The road itself is 405 miles.

There are 4.88 miles having grade between 70 and 75 feet per mile; there are 4.17 miles having grade between 60 and 70 feet per mile; there are 19.85 miles having grade between 50 and 60 feet per mile; there are 15.09 miles having grade between 40 and 50 feet per mile; there are 32.46 miles having grade between 30 and 40 feet per mile; there are 59.49 miles having grade between 20 and 30 feet per mile; there are 84.12 miles having grade between 10 and 20 feet per mile; there are 135.13 miles having grade between 0 and 10 feet per mile; there are 49.81 miles level.

The following is a list of stations and distances:

Name of station.	Intermediate distance.	Total distance.
	Miles.	*Miles.*
State Line	0.0	0.0
Armstrong	1.0	1.0
Muncy	6.5	7.5
Secondine	1.7	9.2
Edwardsville	3.7	12.9
Tiblow	3.5	16.4
Lenape	5.9	22.3
Stranger	4.6	26.9
Fall Leaf	4.2	31.1
Lawrence and Leavenworth Junction	5.2	36.3
Lawrence	1.8	38.1
Buck Creek	6.9	45.0
Williamsville	2.5	47.5
Perryville	3.3	50.8
Medina	1.5	52.3
Newman	2.6	54.9
Grantville	5.1	60.0
Topeka	6.7	66.7
Silver Lake	10.6	77.3
Cross Creek	5.4	82.7
St. Mary's	7.6	90.3
Wamego	13.2	103.5
St. George	6.5	110.0
Manhattan	7.8	117.8
Ogden	11.2	129.0
Fort Riley	6.1	135.1
Junction City	2.9	138.0
Chapman's Creek	12.0	150.0
Detroit	6.5	156.5
Abeline	5.9	162.4

List of stations and distances—Continued.

Name of station.	Intermediate distance.	Total distance.
Sand Spring	3.8	166.2
Solomon	5.2	171.4
Salina	13.7	185.1
Bavaria	8.6	193.7
Rock Spring	10.8	204.5
Fort Harker	13.6	218.1
Ellsworth	4.7	222.8
Cow Creek	11.2	234.0
Wilson's Creek	5.0	239.0
Bunker Hill	13.4	252.4
Fossil	11.6	264.0
Walker	10.2	274.2
Hays	14.4	288.6
Ellis	13.4	302.0
Ogallah	15.5	317.5
Park's Fort	11.5	329.0
Coyote	11.0	340.0
Buffalo	11.0	351.0
Grinnell	13.0	364.0
Carlyle	11.0	375.0
Monument	10.5	385.5
Gopher	12.0	397.5
Sheridan	7.5	405.0

We conclude these remarks on the general location by saying that the whole line bears evidence of the unsettled purposes which have operated in determining it. The change of direction from the original design, of going up the Republican Fork, if made with the view of ultimately reaching New Mexico or the head-waters of the Arkansas river, should have prevented the construction beyond Salina, until the best line, all things considered, was found for passing the ridge between the Smoky Hill fork and the Arkansas; whether by following the Smoky Hill Fork up to the most southern part of the bend, and then leaving it; whether by keeping the line as it now is as far as Ellsworth, and then crossing over to the Arkansas; whether by continuing the route as now built to the end of the track, and then crossing over to the Arkansas; or, whether by taking and keeping the ridge between the Smoky Hill Fork on the south, and the Saline and Republican on the north, all the way till the sources of the Smoky Hill Fork were turned.

Besides the uncertainty in regard to the ultimate termination of the road, and which must have prevented the building of it on the best location, the hostility of the savages rendered it very difficult to make the necessary surveys and examinations.

Without, however, knowing all the reasons that controlled the present location, it is yet apparent that the road is not located so as to take full advantage of the capabilities of the country, and as a through line its commercial value is less than it should have been.

In the details of the location there is too much curvature; the grade is generally laid too near the ground, and follows too closely the undulations of the natural surface. A little cutting at the high points and filling at the low ones, slight changes in the location, and a little more work, would have easily kept down the grades along the Kaw river to 30 feet per mile, which grade should not have been exceeded on this part

of the road. Cheapness of first construction seems to have been the ruling idea, although it seems as if in some places a better road could have been secured without increased expense. What is best to be done to the road depends very much, west of Salina, upon what is to be the future western terminus and destination. If the road is to be extended to form a line reaching to the settlements at the base of the mountains, or to be part of a through line to the Pacific, much of its location requires a thorough overhauling, and parts of it probably must be abandoned. To reduce the grades west of Salina to 30 feet per mile, in the present location, would require a very considerable outlay; but in case the road should ever have a first-class business, this reduction is so desirable that it might be well worth examining whether, to obtain it, the location should not be changed so as to keep in the valley of the Smoky Hill, even at the disadvantage of increasing the distance, or in some other way avoiding the objection to the present line. Had the route been designed originally to reach the valley of the Arkansas, the course of the lower portion of the bend in the Smoky Hill Fork appears favorable for so doing, and the obtainment of low grades might have not been at any material sacrifice of distance. To determine intelligently all the questions involved in the location west of Salina, on the supposition that the road is to be extended, requires extended surveys, and much information not within our reach, and we have, therefore, confined ourselves to a consideration of the road located as it is, in making our estimates for completing it. If, however, the western terminus of the road is to remain where it is, it might be questionable propriety to expend much upon it, unless it be to reduce the higher grades to 60 feet per mile, and thus make that the ruling grade on this part of the line, and by slight changes in the location at some points to reduce the curvature.

East of Salina, however, no question of western terminus will in any wise affect the location, and changes with a view of improving the grades and alignment may be made with entire confidence that, whatever be the ultimate termination of the road, the full commercial value of the outlay will be realized. Some very objectionable grades, as high as 72 feet per mile, and some unnecessary curves, occur on this part of the line, and changes should be made so as to diminish the curvature and secure the easy ruling grade of 30 feet per mile.

The line can be shortened two and a half miles opposite Lawrence and three-fourths of a mile opposite Topeka by continuing the road direct along the bottom lands and cutting off the détours made to reach the stations opposite these places.

ROAD-BED.

The road-bed was designed to be 13 feet wide in embankments, and 15 feet wide in the cuts, but it often falls short of these dimensions. The embankments are generally too narrow and will require widening before ballast can be properly applied, and having mostly been built without leaving any berme, this widening will require more labor than would otherwise have been necessary, as the existing ditches will have to be filled up and new ones made. The banks should be increased in width to a minimum of 14 feet on top, and the cuts to 16 feet at the bottom. There are on the whole line about 75 miles of cuts of different depths. The length of embankments above 3 feet in height are as follows: between 3 and 6 feet, 84 miles; between 6 and 9 feet, 9.34 miles; between 9 and 12 feet, 3.45 miles; between 12 and 15 feet, 1.27 mile; between 15 and 18 feet, 0.33 mile; between 18 and 21 feet, 0.2 mile; between 21 and 24 feet, 0.25 mile; between 24 and 27 feet, 0.25 mile.

CROSS-TIES.

The ties are of double timber, proper size and good quality generally. The number is in some cases less than it should be, but will probably average about 2,300 per mile. A small addition made to the number of ties will place the road in this respect in good condition.

TRACK-LAYING AND BALLAST.

The track has been laid on the bare road-bed, without having the latter previously prepared by a covering of ballast to receive it. The fastenings are the old style wrought-iron chair, now almost universally discarded for either the fish point or for an improved chair of greater strength and bearing surface. On curves the rails were not bent to conform with the curve. With these exceptions, the track appears to have been well laid; but from want of ballasting material its surface has not been well maintained.

With a few slight exceptions, there is no ballast on the road; and from the nature of the material constituting the road-bed full ballast will be required on the whole line, and the material for it is exceedingly scarce and must in most cases be transported a considerable distance. This will make it expensive to ballast this line, more so than roads in general.

CULVERTS AND BRIDGES.

The total number of culverts and bridges on the line which are considered permanent is 203, of which there are 17 Howe truss bridges, having an aggregate length of 2,612 feet, and three straining beam trusses, whose total length is 196 feet. The truss bridges appear good and well proportioned, except the Howe truss across the Kaw river, in which the suspension rods are of inadequate size, rendering them liable when loaded to a strain of nearly 16,000 pounds per square inch of section, which is too great.

Of these 20 bridges, 16 stand on permanent stone abutments and piers, and four on wooden trestles. Of the latter is the bridge over the Kaw river, at the eastern end of the road. Stone work will be required to replace the wooden supports of these bridges. The remaining 183 permanent structures are stone culverts, or open culverts with stone abutments and short timber girders. Some of these are not well constructed, and must be rebuilt, allowance for the probable expense of which is made in our estimate.

Of temporary structures there are 450, of which 187 will be supplied with box culverts, small arches, or abutments with short girders. Of the remaining 263 there are 105 trestle bridges varying from 20 to 50 feet in length, and 158 are from 50 to 470 feet in length. They must all be supplied with permanent stone arches or abutments, and trusses to suit the various openings, and the embankments extended to the abutments.

EQUIPMENT, ETC.

The motive power and rolling stock of this company consists of 29 locomotives, 21 passenger cars, 10 baggage, mail, and express cars, 242 box freight cars, 432 flat cars, 108 stock cars, 72 hand cars, 7 boarding cars.

The locomotives are well constructed, efficient machines, and the cars as good as those on other good roads. The number of locomotives and

cars appears to be nearly or quite sufficient to meet the present requirements of the business of the road, but it must, under any circumstances, be increased as the business increases, and if the road were opened to the base of the mountains or to the Pacific coast the equipment required to operate the 405 miles now built would have to be largely increased. The shop room, engine houses, and other accommodations for the care, maintenance, and repair of the motive power and rolling stock are inadequate to meet present as well as future wants. They are at no point sufficient for present purposes, and considerable expenditure is required immediately for this purpose.

Water stations are erected at intervals of about 15 miles, but the tanks are all too small, and sometimes indifferently constructed. At the stations located on the ridge between the Smoky Hill and Saline Forks, water is generally obtained by wells, some of which are about 125 feet deep. In one instance (Bunker Hill station) water has not yet been reached at this depth. The difficulty of obtaining water on this ridge may have some weight in not making the location continuous upon it. Windmills are employed to pump the water into the tanks in many places. The capacity of the tanks should be at least doubled or trebled, and other improvements made.

STATION BUILDINGS.

The road is not sufficiently supplied with station buildings; some of them are of a very creditable character, but others are inferior, and at some points they are entirely wanting. Additional outlay for this purpose will be required.

SIDINGS.

The sidings are sufficient for present use, and unless the road be extended, will probably answer for some time; but with a good western terminus, the side tracks on this part of the line must be increased.

RAILS.

The rails are of American manufacture, and the pattern is good and sufficiently heavy.

FENCES.

No snow fences have been built, and no cattle fences of consequence. Outlay will be required for both these objects.

The following is an estimate of the probable expenditure which will be required to render the 405 miles already built "equal to a fully completed first-class railroad." It is made on the supposition that the road is to be extended and opened for through traffic to the Pacific coast, and exhibits the expenditures required for labor on the 405 miles we examined, and for the equipment required to work this part of the line. It is as follows:

Estimate.

For increasing width of cuts to 16 feet and embankment to 14 feet at a minimum throughout the entire line.....	$260,000
For changes in location to reduce curvature and improve alignment	240,000
For reducing heavy grades between State line and Lawrence at Gaither's, Stranger Fall Leaf, and Sarcoxie bluffs and other points.....	57,000

For reducing undulations in grades and relieving grades west of Salina	$170,000
For 40,000 additional cross-ties to supply deficiency, including removal of old ties and placing new in track	32,000
For eight abutments and two pier foundations for Howe truss bridges, already erected, including excavation, piles, grillage, and securing with rip-rap	15,000
For 3,600 yards of masonary in abutments and piers, as above, at $15	54,000
For replacing stone culverts of defective construction	20,000
For replacing 187 temporary wood culverts with stone box culverts or stone abutments and short girders, at $500	93,500
For replacing 105 temporary trestle bridges of less than 50 feet length, each with permanent structures, at $700	73,500
For replacing 158 temporary trestle bridges of 50 to 470 feet length with permanent structures, including foundations, at $1,000	158,000
For ballasting, including transportation, lifting track, placing material, surfacing track, and curving rails, 405 miles, at $1,300 per mile	526,500
For snow fences	30,000
For cattle fences	50,000
For 50 additional locomotives, at $14,000	700,000
For 15 passenger cars, at $6,000	90,000
For 10 baggage, express, and mail cars, at $2,800	28,000
For 400 box freight cars, at $900	360,000
For engine houses, turn-tables, machine shops, blacksmith shops, &c., and for tools and machinery for same	550,000
For additional water stations, and machinery for raising water	75,000
For additional station buildings	70,000
Total	3,652,500

We repeat, in closing this estimate, that the propriety of much of this expenditure is contingent upon the extension of the road to a proper western terminus. Were it to be built no further than it now is, much of the estimated outlay for additional equipment would not be required, and perhaps even part of that for improving the location and alignment and grades might be of doubtful propriety.

TELEGRAPH LINE.

The telegraph poles are erected along the line of the road as far as built, and seem well put up, but are rather too slender. Two wires are stretched on them from the eastern terminus west to Ellsworth, and thence to the west end of the track a single wire is stretched. Telegraph stations are occupied sufficient for the present operations of the road.

The foregoing report we believe completes the specific duties required of us in regard to the Union Pacific railway, eastern division.

We are, very respectfully, your obedient servants,

G. K. WARREN, *Brevet Maj. Gen. U. S. A.*,
J. BLICKENSDERFER, JR., *Civil Engineer*,
United States Special P. R. R. Commissioners.

Hon. O. H. BROWNING,
Secretary of the Interior.

CHICAGO, ILLINOIS,
December 15, 1868.

SIR: Having completed our examination of the Union Pacific railway, eastern division, we proceeded to examine the Sioux City and Pacific railroad, arriving at the south end of that line, where it connects with the extension of the Chicago and Northwestern road, about six miles west of the Missouri Valley station, on the 8th of December. From this point, accompanied by the assistant superintendent and auditor of the road, with a special train we passed over the line to Sioux City, examining all, except twenty miles, the same day. The next day we returned to the south end of the road, and continued westward to the crossing of the Missouri river. The river was at this time closed with ice. Previously a ferry-boat had been used, and we were informed it was designed to keep open a passage and maintain the ferry during the winter. The construction of the line from this point westward to Fremont, we were advised, is being prosecuted with energy, the grading being mostly done, and about 17 miles of the tract laid. Two locomotives are on the west side of the river.

Being advised that all the work done on the west side of the Missouri was in an incomplete state, and that the company did not expect us to examine that portion of the work, we decided to proceed no further.

There had been a very severe snow-storm, with a large fall of snow, for several days, the snow being on an average probably 18 inches deep, but it was so generally blown from the track on account of the grade being laid high enough to permit this, that we could see and inspect the road-bed very well.

This road, beginning at Sioux City, has a very direct course, the direction being on an average south 20° east, for 69½ miles. It then turns due west, and, in a distance of three and a half miles, reaches the bank of the Missouri nearly opposite to De Soto. It is designed to cross the Missouri at this point and proceed in as direct line as practicable to Fremont, uniting there with the Union Pacific railroad. In regard to the general location it may be said that if the design be to secure a western connection with the Union Pacific railroad for eastern roads centring at Sioux City, on the most direct and practicable line, the course taken seems not well calculated to effect this object, being for a distance of about 70 miles nearly at right angles to the direct route, and this necessarily makes a great increase in distance. But as we understand that the government has assented to the location as it is, we shall confine our report to the details of the road as built on the eastern side of the Missouri river.

The *location* from Sioux City to the junction with the branch of the Chicago and Northwest road is quite direct, with but very little curvature, well chosen to secure the occupation of the highest portion of the bottom lands, and devoid of high grades. At Sergeants Bluffs is a cut through a point made to avoid the washing banks of the Missouri river, and here there is a grade each way of 53 feet per mile, extending in all about nine-tenths of a mile, which is the maximum grade on the line, the other portions of it differing but little from a level. Our opinion is that the proper working of the road will require this grade at Sergeants Bluffs to be reduced, which can be done at moderate expense.

The *road-bed* is good, the embankments being generally from 14 to 16 feet wide on top, and the cuts 20 feet wide at the base. A good berm has been left on each side of the embankments, and the grade is well elevated above the natural surface, thus rendering it exempt from over-

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flow, securing a dry track, and freedom from liability to be obstructed by snowdrifts.

The *ties* are good, of durable timber, proper dimensions, and used in sufficient quantity; and the track is well laid with fish-plate fastenings, full spiked and well surfaced, but placed on the bare road-bed.

The *rails* are of American manufacture, of good quality, and weigh 56 pounds to the yard.

For *ballast* there is no good material contiguous to the line. A fine sand is found in drifts in several places, which will make tolerable ballast, but having the defect of drifting in high winds, it will, if used, require frequent renewal. As it is, however, the only material available for the purpose, it will have to be used. Very little ballast has been put upon the roads, and the entire line will have to be supplied.

BRIDGES.

There are three permanent wooden Howe truss bridges of an aggregate length of 420 feet. They are of good quality and well proportioned, except some of the suspension bolts on the long spans, which are of inadequate size near the ends of the span. These trusses are supported on trestles with pile foundations, and piles for permanent stone abutments have been driven.

Of *temporary* trestle bridges there are 56, supported on piles, and having an aggregate length of 9,388 feet; stone abutments must be supplied for the Howe truss bridges, and permanent structures are required to replace the temporary trestle work.

EQUIPMENT.

The motive power and rolling stock consists of six locomotives, four passenger cars, one baggage, mail, and express car, three caboose cars, 49 box cars, 30 flat cars, 15 coal cars, 19 hand cars, and five special cars used in construction, &c.

These are all of good quality and equal to those on the best roads. They are probably sufficient for present business, but must be largely increased when connections with the eastern and western roads are made.

Permanent *water stations* are erected at Sioux City, River Sioux, and Missouri Valley, with tanks of sufficient size and with wind-mills to raise the water, which is found abundant a few feet below the surface of the bottom land. There is also a *temporary* water station, with small tank, at Sloan. Some additional water tanks will be required on the line to meet the future business.

Good *station buildings* with ample side tracks for the passage of trains and the transaction of business at the station are constructed at nearly all the points required, but a few additional ones will be needed. The company having a perpetual lease of the branch of the Chicago and Northwest roads, six miles in length, intend working it in connection with their road, and are erecting their principal shops at the junction of the branch with the Chicago and Northwest roads. Station buildings will be needed at this point.

There are no fences to speak of on the road. Cattle fences will be required, but snow fences will not.

The following is the estimated expenditure required to complete and fully equip so much of this road as lies east of the Missouri river, ready

for business when the line is opened through to its connection with the Union Pacific railroad:

For increasing the width of narrow places on embankments to 14 feet on top, and for reducing grades at Sergeant's bluffs to 30 feet per mile	$20,000
For six abutments, foundations for Howe's truss-bridges, already erected, (piles already driven,) including grillage and ripraps, at $1,000	6,000
For 3,650 yards bridge masonry for abutments as above, at $15	54,750
For supplying 40 trestle bridges 8,500 feet long with permanent stone abutments and piers and girders or trusses, including foundations, at $3,000	120,000
For supplying 16 short trestle bridges with permanent stone culverts, at $600	9,600
For ballasting, including transportation, lifting track, placing material, and surfacing road 73 miles, at $1,300	94,900
For 8 additional locomotives, at $14,000	112,000
For 3 passenger cars, at $6,000	18,000
For 3 baggage cars, at $2,800	8,400
For 85 freight cars, at $900	76,500
For additional engine-houses, machine-shops, and for machinery and tools for same	50,000
For additional station buildings	12,000
For additional water stations	7,500
For cattle fences	30,000
Total	619,650

It will be seen that we have not included an estimate of the cost of the bridge across the Missouri river, and the approaches to it, which will have to be built to secure an adequate connection of Sioux City with the Union Pacific railroad.

TELEGRAPH LINE.

The telegraph line is substantially and well built along the line of the railroad.

The conclusion of the report completes the duties assigned to us.

Very respectfully, your obedient servants,

G. K. WARREN,
Brevet Major General United States Army.
J. BLICKENSDERFER, JR.,
Civil Engineer.

Hon. O. H. BROWNING,
Secretary of the Interior.

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